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29 June 1977

EAST

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Scientific Affairs

No. 550

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TRANSLATIONS ON EASTERN EUROPE

SCIENTIFIC AFFAIRS

No. 550

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CEMA ATOMIC ENERGY COMMISSION VIEWS VIDEOTON COMPUTERS

Budapest MAGYAR HIRLAP in Hungarian 11 Jun 77 p 7

[Excerpt] The CEMA delegation at the 32nd session of the standing committee for the peaceful use of atomic energy visited the Videoton Factory on 10 June. They were received by Bela Demeter, deputy technical director of Videoton, who briefed them about the work of the big plant. The visitors were primarily interested in the production and use of computer technology equipment. This branch now accounts for nearly half the output of Videoton. The small computers and peripherals are used extensively in the unified computer system of the socialist countries. For example, over the past 4 years 27 R-10 computers and complete peripheral systems were put into operation to assist work in the field of nuclear research in the socialist countries.

CSO: 2502

HOW TO OPERATE THE NEW BRIDGE-LAYING TANK

Sofia VOENNA TEKHNIKA in Bulgarian No 4, Apr 77 pp 6-8

[Article by Colonel Engineer Nikola Kotsev: "Operation of the BLG-60-M Bridge Layer"]

[Text] The BLG-60-M bridge-laying tank is a new engineering machine. On the surface it resembles the BLG-67. However, its individual systems and mechanisms have been designed and executed differently. In turn, this has brought about changes in the machine's technical requirements and operational conditions which must be known in the course of its use.

The following principles must be mandatorily observed in operating the BLG-60-M bridge-laying tank:

With or without the bridge the tank must be driven carefully and the speed must be consistent with the terrain. In the opposite case the big weight and length of the bridge could cause an adverse shift in the center of gravity which might damage the laying mechanism, securing system, or moving gear.

Before the start the expanding steel cable should be tightened and the expanding cylinder must be blocked. The crane behind the driver's seat must be locked. The distributor valve of the hydraulic coupling must be turned off as well (the lever is located on the right side of the mechanic-driver, behind the gearshift). The electromagnetic pump coupling (main switch A-I in zero position) must be released as well.

Before laying (lifting) the bridge on (from) the obstacle the tank must be positioned at a 3 m distance from the site where the girder will begin by activating the braking system. Subsequently, we must consecutively engage the hydraulic clutch distribution valve with the electromagnetic clutch, seeing that the controlling pressure of the hydraulic system, as shown on the pressure gauge, is no less than $2 MN/m^2$ ($20 kg/cm^2$).

If the oil temperature exceeds 288°K (15°C) the hydraulic system may be engaged without any special preparations. However, should it be below 258°K (-15°C) the hydraulic pump should work for 10 minutes without pressure after which the pressure must be increased and the pump made operational.

In operating the hydraulic pump the number of rpm's should be 1,200. It is strictly forbidden to change the rpm's with a working pump.

After using the A-3 switch it must be turned off immediately after the bridge has been placed on the obstacle. In the opposite case damages may occur.

The hydraulic system operates with oil HLP-32V which retains its viscosity (3,000 s.st) within the 248°-333°K (-25° +60°C) temperature range. No other oils may be used. The oil-producing companies do not guarantee the purity of the oils from material admixtures. That is why, before filling the system, in all cases and circumstances, it is mandatory to filter the oil using a filter with a maximal 25 mm mesh. The oil may be warmed up before filtering to lower its density and facilitate the pouring.

The hydraulic systems must be filled with the help of an oil pump equipped with special filters.

It is forbidden to move the tank after the removal of the bridge from its fastening system and until it is layed across the obstacle. Moving the bridge for purposes of releasing the laying mechanism may be accomplished only through the shoving mechanism. Should it be impossible to move the bridge by this method, the tank's braking system must be released so that it may shift.

The tank may be moved over a distance in excess of 500 m after fastening the laying mechanism with the help of the special levers.

If a single brigde is used it is layed across the obstacle in such a way that its ends are lying at least 0.5 m on the banks while the steel cables remaining below the bridge should not lie on solid objects (stones, concrete, bits of hard rock) (Fig 1).

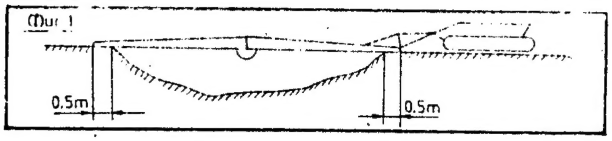
Should the bridge ends be layed over an area in excess of 0.5 m long, they should not be left hanging. Otherwise the bridge may be damaged (Fig 2).

The bridge may be layed on both a reverse or front shoulder with a pitch of up to 25°, as well as across an obstacle with a rise or a drop not to exceed 0.8 meters and with a side pitch of no more than 6°.

Differences in the levels of the two ends of the bridge lying across the obstacle may not exceed 150 mm.

Two bridges are used when the length of the obstacle exceeds the length of a single bridge (Fig 3) or should differences in the levels of the two shoulders be too high and prevent the laying of a single bridge (Fig 4).

(1)



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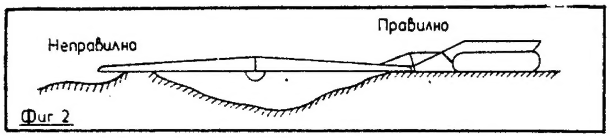

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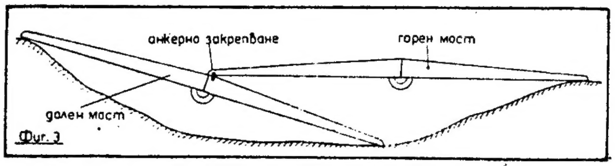

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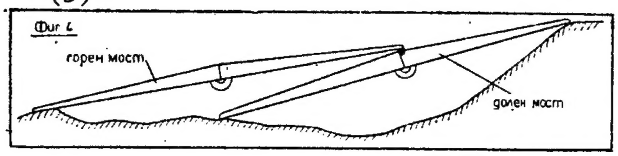

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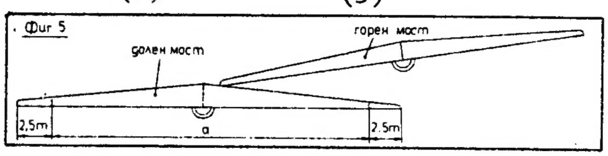

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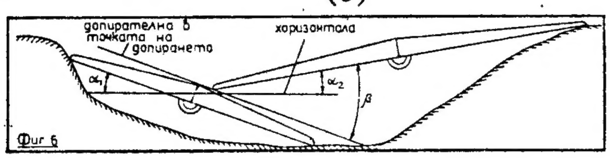


Key:

1. Figure
2. Wrong
3. Right
4. Anchoring
5. Upper bridge
6. Lower bridge
7. Tangential at the touching point
8. Horizontal

The upper bridge may rest on the lower in zone "a" at a distance of no less than 2.5 m of its ends (Fig 5).

In laying two bridges the tangential angle between the resting point and the lower frame of the upper bridge $\measuredangle\beta$ should not exceed 20°

$$(\alpha_1 + \alpha_2 = \beta = 0° \text{ to } 20°)$$

The angle between the horizontal and lower frames of the bridges may not exceed 12.5° (Fig 6).

The BLG-67 bridge may be included in a combination. In such a case it may be used only as a lower bridge since it lacks an attachment for anchor fastening.

Should the bridges be layed across a water obstacle the length of the part of the lower bridge under water should not exceed 12 m (a = 12 m).

In the case of running water the sum of the length of the sunken part of the bridge and the velocity of the water's current may not exceed 10 m/second.

In such a case anchoring is mandatory for both bridges.

Only properly entitled military servicemen may be allowed to operate the BLG-60-M bridge-laying tank after studying the structure and operational principles and the safety measures. Thus, for example, after the hydraulic pump connector has been engaged standing on the tank is forbidden. Standing of people in the area of the dropping of the bridge on the left and the right of the tank is forbidden within a distance of 10 m, as well as 23 m from the front and 3 m from the hind ends.

Operating the bridge with an open hatch the driver's cover must be locked. A sound warning must be mandatorily given when engaging the hydraulic system.

The bridge-laying tank may be moved only after the bridge has been fastened on the tank with the blocking system, the expanding cable is taut, the expanding cylinder blocked, and the hydraulic system disengaged.

Some major or minor irregularities may occur in operating the BLG-60-M bridge-laying tank. Thus, should the end releases fail to be activated, the work may be continued by permission of the senior commander. The mechanic-driver must display particular skill and attention in order to prevent damages. The elimination of the damage is done by the mechanic-driver who must clean and lubricate the contacts and moving parts.

Should the disengaging mechanism fail to operate after that the help of a specialist from the technical work shop must be sought.

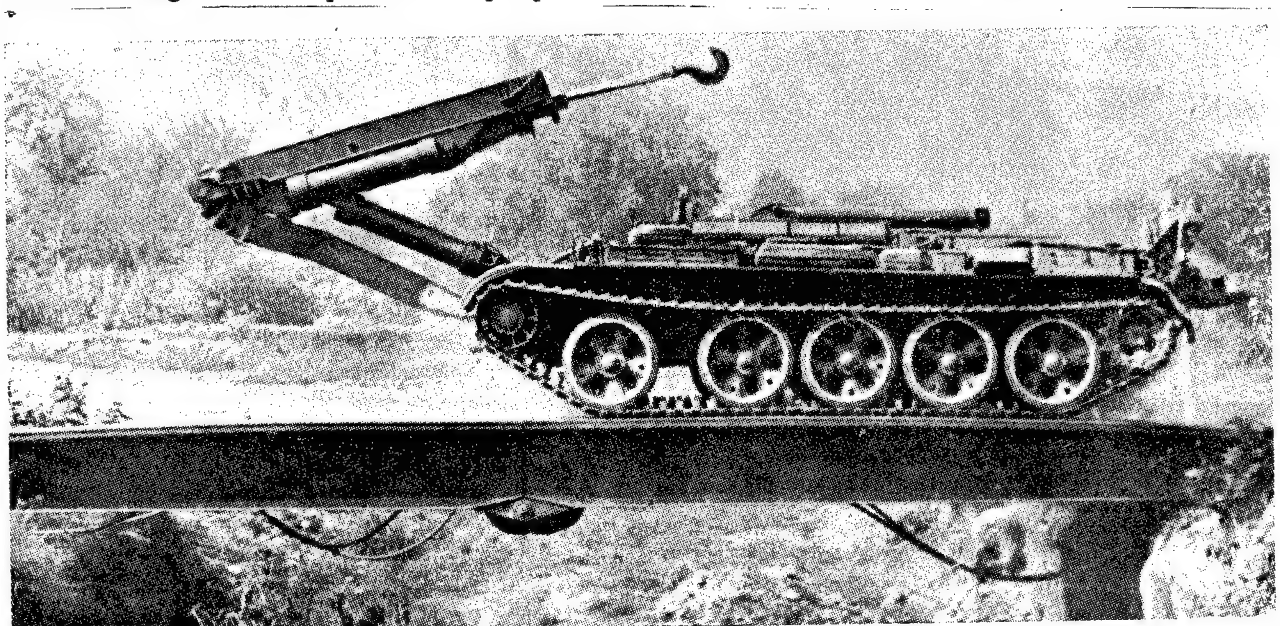
As a result of external friction, blows and bends, pipes and flexible couplings may be worn out and may even crack. In such cases they may not be welded but must be replaced. Should the piston rods of the hydraulic cylinders bend by over 2 mm over a 500 mm length they must be replaced.

In some cases the hydraulic pump may fail to provide the necessary pressure or work at a lowered pressure. The reason must be sought in the electric clutch. Should it fail to engage (disengage) we must check the state of the bobbins in the electromagnet or the condition of the electric circuit leading to them. If there is power at the terminals but the bobbins are oily or torn, the case of the electromagnet must be changed. If the electric clutch disks become oily they are unable to transmit fully the angular momentum of the pump (they slip). The clutch must be dismantled, the disks cleaned from the oil and the dirt and, if servicable, reassembled. If not they must be replaced.

The electric clutch disks may also slide in the case of disturbed regulation of the distance between the moving ring and the clutch casing. We must always be careful to maintain the proper distance, for should it drop to zero and should the ring touch the casing, the entire electric clutch will break. In order to control this distance an aperture has been set on the electric clutch with two markers determining its edges.

Damages may occur in the hydraulic battery as well. Here the sensitive part is the membrane which must be replaced every two years. If prior to this the pressure within the hydraulic battery system begins to drop 15 mm under 0.5 MN/m^2 (5 kg/cm^2) and, in 3 hours, over 3.5 MN/m^2 (35 kg/cm^2), the membrane must be replaced.

This has been a review of the stipulations governing the operation of the BLG-60-M bridge-laying tank. Their observance is a prerequisite for maintaining it in a permanent proper technical condition and combat readiness.



5003
CSO: 2202

BULGARIAN-MADE INTEGRATED CIRCUITS DESCRIBED

Sofia VOENNA TEKHNIKA in Bulgarian No 4, Apr 77 p 17

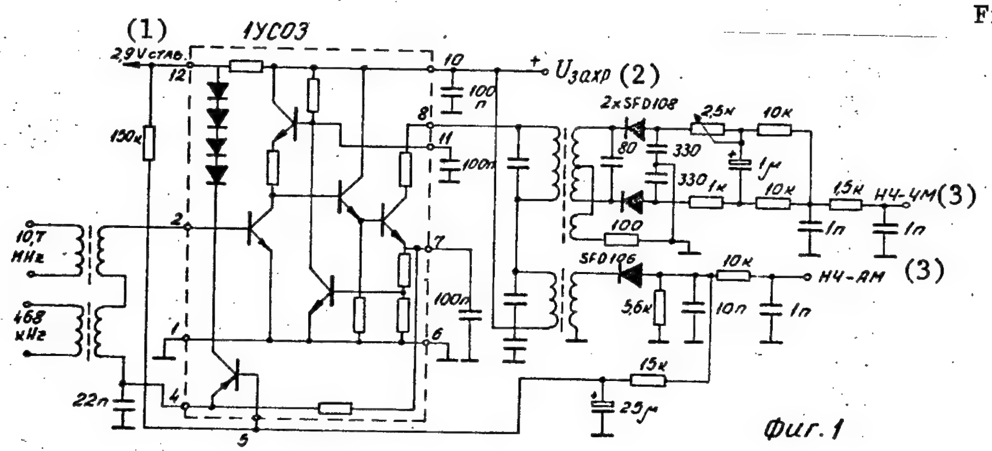
[Article by Engineer Grigor Savov, scientific associate: "Bulgarian Linear Integrated Circuits"]

[Text] Integrated circuits for a medium frequency AM/FM amplifier and a W low frequency amplifier have been developed by the Institute for Semiconductor Equipment in Botevgrad, for use in household electronic equipment. Plane-epitaxic technology was used in their manufacturing. Their casing is made of metal and glass.

IUS03 Intermediary Frequency Amplifier

This amplifier amplifies AM and FM signals in radio receivers. It is similar to the TAA981 produced by Siemens. In working with AM signals the ARU [Automatic Level Control] circuit with a 60 decibel range operates. Figure 1 shows a general application chart while Table 1 provides the basic parameters.

Figure 1



Key:

1. Regulator
2. Power supply
3. Low frequency-frequency modulation

Table 1

Таблица 1

(1) Параметри	(2) Означение	(3) Дименсия	Стойност (4)
(5) Захранващо устройство	(6) $U_{захр}$	V	$5 \div 12$
(7) Ток на консумация ($U_{захр.} = 9V$)	I_o	mA	< 8
(8) а) при работа на AM $f_0 = 468$ kHz			
(9) Коефициент на усилване по напрежение	K_V	dB	> 90
(10) Обхват на действие на АРУ	АРУ	dB	> 60
(11) Изходно НЧ напрежение при $U_{вх} = 15\mu V$	(12) $U_{изх\,НЧ}$	mV	> 100
(13) Коефициент на нелинейни изкривявания при $U_{вх} = 15\,mV$	$K_{нн}$ (14)	%	< 10%
(16) Праг на задействуване на АРУ	$U_{праг}$ (17)	μV	15
(18) б) при работа на ЧМ $f_0 = 10{,}7$ MHz			
(19) Коефициент по усилване по напрежение	K_V	dB	> 86
(20) Входно напрежение за получаване на ограничение	$U_{вх}$ (15)	μV	< 225
(21) Изходно НЧ напрежение при $U_{вх} = 100\,mV, \Delta f = 75$ kHz	$U'_{НЧ}$ (12)	mV	> 300
(22) Коефициент на нелинейни изкривявания при $U_{вх} = 100\,mV$, $\Delta f = 75$ kHz	$K_{нн}$ (14)	%	< 3
(23) Подтискане на AM сигнали	$\frac{U_{ЧМ}}{U_{AM}}$ (24)	dB	> 50

(25) *Параметрите са измерени при захранване $E_{захр.} = 9V$

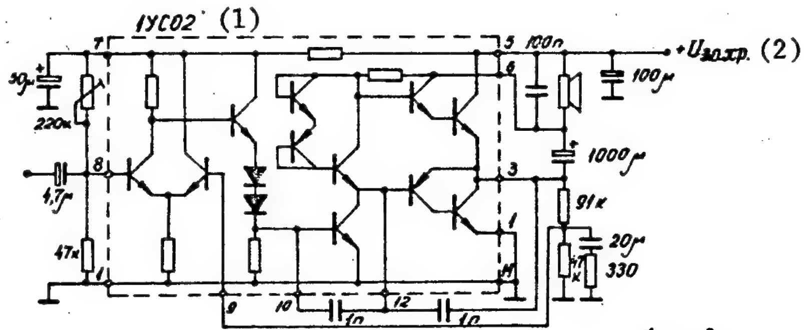
Key:

1. Parameter
2. Symbol
3. Unit of measurement
4. Value
5. Power system
6. Power
7. Consumption current
8. a. In operating with AMf_o = 468 kHz
9. Current amplification coefficient
10. ARU [Automatic Level Control] range of action
11. Initial low frequency amplifier tension when U_{input} = 15μV
12. Output low frequency
13. Nonlinear distortions coefficient when U_{input} = 15mV
14. Nonlinear distortions input
15. U_{input}
16. ARU activation threshold
17. Threshold
18. b. Operating with FMf_o = 10.7 kKz
19. Tension amplification coefficient
20. Input tension for clipping
21. Output low frequency tension when U_{input} = mV, Δf = 75 kHz
22. Nonlinear distortion coefficient when U_{input} = 100 mV, Δf = 75 kHz
23. AM signal suppression
24. U_{FM}/U_{AM}
25. Parameters measured with power supply E_{supl} = 9V

Powerful Low Frequency Amplifier IUSO2A and IUSO2B

Used as the final step in portable battery-fed systems--radio receivers, tape recorders, and other low frequency systems. Requires a minimal number of external elements. The basic circuit is shown in Figure 2 and the basic parameters in Table 2.

Figure 2



Фиг. 2

Key:

1. IUSO2
2. Power Supply

Table 2

Таблица 2

(1) Параметър	(2) Означение	(3) Диаметър	(4) 1УС02А	1УС02Б (5)
(6) Захранващо напрежение	$U_{захр}$ (7)	V	9	12
(8) Ток през крайните транзистори	$I_к$ max. (9)	A	0.75	1
(10) Товарно съпротивление	$R_т$ (11)	Ω	8	8
(12) Разсеяна мощност	$P_{tot\ max.}$	W	0.6	1.2
(13) Изходна мощност ($K_{НН}$ = 10 %)	——	W	>0.85 <1.8	>1.3 <1.8
(14) Коефициент на нелинейни изкривявания (0.5 $P_{изх.}$)	$K_{НН}$ (15)	%	0,9	1
(16) Входно напрежение ($P_{изх.} = P_{max.}$)	$V_{вх.}$ (17)	mV	< 11	< 13.5
(18) Входно съпротивление	$R_{вх.}$ (19)	KΩ	>25	> 25
(20) Начален ток	I_0	mA	<10	<15
(21) КПД	η	%	>60	>60

(22) * Схемата работи с радиатор

Key:

1. Parameter
2. Symbol
3. Diameter
4. IUSO2A
5. IUSO2B
6. Power tension
7. Power
8. Current through end transistors
9. I_c max.
10. Loading resistor
11. R_1
12. Dissipated power
13. Output power (K_{nd} = 10 percent)
14. Nonlinear distortion coefficient (0.5 P_{output})
15. $K_{nonlinear\ output}$
16. Input tension ($P_{output} = P_{max.}$)
17. V_{input}
18. Input resistor
19. R_{input}
20. Initial current
21. Efficiency
22. System operating with a radiator

5003
CSO: 2202

BULGARIA

USE OF HYDROGEN AS ENGINE FUEL DISCUSSED

Sofia VOENNA TEKHNIKA in Bulgarian No 4, Apr 77 pp 23-24

[Article by Colonel Engineer Rashko Todorov: "Hydrogen as Automobile Fuel"]

[Text] Hydrocarbon fuels (petroleum, natural gas, and coal) reserves are being exhausted rapidly. Even the most optimistic forecasts indicate that petroleum and natural gas reserves would last no more than 100 to 150 years. That is why the scientists are focusing their efforts on finding substitutes for petroleum and natural gas. According to specialists hydrogen (low energy carrier) obtained from water, using the power generated by nuclear or thermonuclear plants, may become one such substitute. Furthermore, it is assumed that after the year 2000 a "hydrogen economy" will be developed.

At the same time, the question of protecting the environment from pollution is facing mankind evermore seriously. The motor vehicle is one of the main pollution sources, accounting for 35 percent of the total atmospheric pollution.

Large quantities of carbon and nitrogen oxides and other toxic compounds particularly harmful to people, animals, and nature in general, are released into the atmosphere as a result of combustion of petroleum fuels in internal combustion engines, through exhaust gases.

The elaboration of essentially new systems which would use gasoline fumes with the help of thermal exchange or gasoline fractioned in advance and converted into burning gas is merely at its beginning. However, even such systems would be unable to provide a radical solution to the question which is directly linked with choosing the type of fuel to be used.

In recent years all highly developed countries have engaged in intensive research for the use of new fuels which would successfully replace gasoline and diesel fuel and would not pollute the atmosphere. Considerable successes have been achieved with the use of compressed and liquified hydrocarbon

gases such as propane-butane, methane, and others. The extensive use of such fuels is blocked by the limited number of filling stations, the need for specially manufactured tanks, lowered engine power, and others.

One of the particularly promising ways for eliminating atmospheric pollution caused by automobiles is to replace hydrocarbon fuels used so far with hydrogen.

Hydrogen is extensively widespread in nature. It accounts for 1 percent of the content of the earth's crust (lithosphere and hydrosphere). Hydrogen is part of the most widespread substance on earth--water (11.19 percent mass). In outer space hydrogen is the most widespread element. As plasma it accounts for about one-half of the solar mass and of the mass of most stars, for the bulk of interstellar gases and gas nebula. It is also present in the atmospheres of a number of planets and comets.

Hydrogen is a colorless, odorless, and tasteless gas. It liquifies at 21°K (252.6°C), and solidifies at 14°K (259.1°C). It has the highest heat conductivity of all gases. It dissolves well in a number of metals (up to 850 volumes per volume).

The main raw materials needed for the production of hydrogen are natural gas, coke gas, petroleum refining gases, and the products of the gassification of solid and liquid fuels. Hydrogen is also obtained through water electrolysis. Currently hydrogen is extensively used in industry mainly in the manufacturing of ammonia, alcohols, and hydrochloric acid, for the hydraulic treatment of petroleum products, welding, and others. Hydrogen is extensively used as rocket fuel. It has a very high heat-generating capacity. The burning of 1 kg hydrogen releases 28,000 kilocalories compared with only 12,000 per kg of gasoline, which is nearly 2.5 times less.

At present the mass use of hydrogen as motor vehicle fuel is governed by the solution of two main problems.

The first problem is related to the production of hydrogen in quantities needed to meet transportation requirements at an economically profitable cost. Its production through electrolysis is uneconomical. Fortunately, there are over 30 chemical means for the production of hydrogen from water at a temperature of 1,003°K to 1,273°K (730°C to 1,000°C). The oxygen currently obtained through the bromium-mercury cycle is only four to five times more expensive than gasoline. Using the sodium-oxygen cycle (which requires a temperature slightly above 1,000°C) the price of the hydrogen would equal and may even be lower than that of gasoline. The production of huge amounts of hydrogen at an insignificantly low cost may be achieved by the use of electric power plants with a high temperature gas-cooled reactor and reactors for thermonuclear synthesis.

The second problem to be resolved has to do with hydrogen transportation and storage. Under certain conditions compressed hydrogen may explode. That is why its storage in steel bottles under a pressure of 20 MN/m^2 (200 kg/cm^2) is unsuitable. Liquified, however, it does not present a danger of explosion and may be transported in special tankers (diaryl [diarovi] containers). However, these cannot be sealed which leads to great evaportion losses. According to a number of specialists hydrogen could be transported economically through pipelines as well. In Europe such a pipeline has been in operation since 1938. One of the promising methods for its storage and transportation is based on the ability of some alloys to absorb large quantities of hydrogen between their molecules (1 kg of alloy can absord up to 200 dm^2 of hydrogen). Theoretically, however, the possibility exists for the creation of alloys which could absorb from 5,000 to 8,000 dm^2 of hydrogen per kg of alloy. The release of the hydrogen from the alloy may not occur under standard temperature or pressure. It is achieved at a temperature of 423°K (150°C) and a pressure of 0.3-0.4 MN/m^2 (3-4 kg/cm^2). Research leading to the production of metal hydrogen has been considerably advanced in the USSR. It is believed that this will resolve radically the question of its storage and transportation.

The initial successful attempt to use hydrogen as fuel for diesel engines with direct fuel injection was made at Oklahoma State University (United States) in 1968-1970. Here three experimental motors were mounted on a base and were kept running for 2 years with no changes in their characteristics.

The discovery of a method for preserving hydrogen in the powder compositions of some metals (in lanthanum-nickel hydrates, for example) would considerably reduce the time before hydrogen could be utilized as automobile fuel. One volume unit of the powder of this alloy with practically normal atmospheric pressure would absorb as much hydrogen as a steel cylinder with a pressure of 100 MN/m^2 (1,000 kg/cm^2).

Specialists at the Institute for Problems of Machine Building of the Ukrainian SSR Academy of Sciences, together with specialists from Moscow, Leningrad, and many other union republics have used an interesting principle. Taking the Moskvich automobile they developed an experimental prototype whose motor uses hydrogen instead of gasoline. A miniature reactor has replaced the gasoline tank in the car. The metal powder it contains is blended with water. Hydrogen is released as a result of the chemical reaction which develops. The thus obtained hydrogen is mixed with air and fed to the motor's cylinder. The fueling system of the new car is nonexplosive. On the basis of the same principle hydrogen could be used as fuel for all internal combustion engines.

Several months ago the press reported that an internal combustion engine using hydrogen instead of gasoline was already undergoing tests at the Central Scientific Research and Design Institute for Fuel Equipment for

Motor Vehicle Transportation and Stationary Motors in Leningrad (USSR). The hydrogen engine created by the institute's collective is part of a general program for the development of engines using new types of fuel. The efforts of the specialists are focused on the creation of engines which would decisively lower the volume of toxic gases emitted by internal combustion engines.

The new hydrogen engine has a special feeding system and an electronic system which carries the hydrogen to the engine's cylinders. The tests of the hydrogen fuel system and of the engine itself have been conducted for quite some time and the results have been very good. The engine is working smoothly and noiselessly, and its relative fuel outlays equal 180 g e k c/h. According to the institute's director, Doctor of Technical Sciences Yuriy Sviridov, the new engine structure could be the basis for serial manfacturing under industrial conditions so that toward the end of our century hydrogen may become the basic source of energy for internal combustion engines not only in automotive transportation.

As we may see, basic changes in the structure of the standard internal combustion engine are not necessary with the use of hydrogen fuel. The only changes apply to the advance injection angle, gas distribution phases, and engagement of the gas mixer and compressor in the fueling system.

According to supporters of the "hydrogen economy," in the next few years the necessary technical prerequisites will be developed for the production of hydrogen less expensively than of petroleum products and electric power.

Dr Linden, director of the Gas Technologies Institute in Chicago, has proved that the transportation of gaseous hydrogen along a 0.75 m diameter pipeline over a distance in excess of 80 km is less expensive than the transportation of an equivalent amount of electric power (AC) along an underground cable. At a distance in excess of 450 km pipeline transportation becomes less expensive than the use of surface electric cables (for DC with a 400,000 volt tension). Over a distance in excess of 900 km its transportation is less expensive than a surface power cable transporting 500,000 volts of alternating current.

Extensive possibilities exist for the use of hydrogen as fuel in all fields of human activity. Unquestionably, mankind will make use of such opportunities. This is guarateed by the intensive scientific studies underway in the United States, the FRG, Japan, and, particularly, the USSR.

5003
CSO: 2202

BRIEFS

FIRST ARTIFICIAL HEART--The first artificial heart produced in Czechoslovakia is now undergoing testing at the Czechoslovak Academy of Science's Institute for Hydrodynamics in Prague. It was produced in the Brno research laboratory, "Assistance to and Replacement of the Heart," headed by Prof Dr J. Vasku. The artificial heart is a membrane type produced from polymethyl-methacrylate. Its resilient parts are made of polyurethane and silicone rubber. It pumps 12-15 liters of blood per minute at a frequency of 150 beats per minute. The heart can be placed in the chest of an experimental animal. [Prague ZEMEDELSKE NOVINY in Czech 11 Jun 77 p 6]

CSO: 2402

EAST GERMANY

INSTITUTE DIRECTOR ADVOCATES FAST BREEDER REACTOR DEVELOPMENT

East Berlin SPEKTRUM in German May 77 pp 10-11

[Article by Professor Doctor-Engineer Guenter Flach, director, Central Institute of Nuclear Research: "The Fast Breeder Reactor--Basis of Fuel Supply for Long-Term Nuclear Energy Program"]

[Text] The question as to securing a stable energy base is being asked more and more frequently and more and more seriously under the conditions of a growing world population, the efforts of the developing countries to catch up, and the constantly rising specific expenditure, including in terms of energy, for the procurement of raw materials and foodstuffs. Former President Ford asserted at the 1974 World Energy Conference that the (capitalist) energy crisis is the cause of the currency crisis and other critical weak points of capitalism. This of course is a confusion of cause and effect but we are left with the significant role which the energy industry plays in modern society and which therefore under capitalism cannot remain untouched by crisis phenomena and which, because of its role in the production process, is just about the measure for crisis phenomena.

As far as the significance of the energy industry for the progress of socialism and the gradual transition to communism is concerned, we need only cite Lenin's well-known statement: "Communism is Soviet power plus electrification" and the statement of the party congresses of the brother parties in the socialist countries regarding the development of national energy industries and the formation of an integrated fuel-energy industry in the CEMA area. This role of the energy industry emerges among other things also in the expenditures which currently amount to about 30 percent of the total expenditures for the national economy. In view of these facts, the initially mentioned question is only is too understandable. The answer to it is certainly multilayered but in any case presupposes an evaluation of primary energy sources which will be available to us during the next decades.

If we keep in mind that, in 1975, energy was produced for about $8.8 \cdot 10^9$ t SKE (hard coal equivalent) and that this magnitude, under favorable conditions, will be about $22 \cdot 10^9$ t SKE in the year 2000 and if we compare to that the primary energy deposits estimated in the table, then, assuming an identical requirement, we can say that the energy base will be secured for about 150

years as of 2000. Such estimates of course are full or errors; in addition there is the fact that the uneven distribution of these deposits in the various geographic regions brings about completely differing situations. But it is certain that these primary energy sources will run out sooner or later and here it must be kept in mind that they are significant also for the materials economy.

As we know, nuclear energy is the only possible alternative from the present viewpoint in terms of energy content and in terms of the technical feasibility, at economically justifiable expenditures. Of course this is so--and we must make this perfectly clear--only if it should turn out to be possible technically to implement the breeding process with sufficient efficiency, that is to say, the conversion of (almost) nonfissile U-238 or Th-232 into fissile Pu-239 and U-233. If this cannot be done, then nuclear fission energy will only have been an episode. Starting with the presently estimated uranium deposits and the fact that about 1.5 percent of natural uranium can be used for energy purposes in thermal reactors, (about 2X share of fissile U-235 in natural uranium), we get a boundary output of 2,000-3,000 GWe. Here is what that means: this kind of nuclear energy system will not be in a position to secure the base of a large-scale energy industry throughout the world. It is all the more understandable that debates have increasingly been conducted recently with regard to the development potential of the fast breeder reactor.

But before we can go into the current status of the development of fast breeder reactors and thus the chances for the implementation of a nuclear fission energy system in long-range terms, we might make a few remarks on an integrated coal-nuclear power plant energy system. In primary energy balance, solid fuels will of course reveal a shrinking share although they will continue to be of great significance. At the same time, the share of nuclear energy out of primary energy will rise to about 25 percent by the year 2000. While at this time and in the near future, nuclear energy will be used primarily for electric power generation, we can expect the increased use of nuclear energy for heat supply after 1980. This involves first of all the supply of low-temperature heat according to the principle of heat-power combination and later on also nuclear heating plants with special heat reactors. Further expansion of application can be expected with the use of high-temperature reactors. In addition to the supply of high-temperature heat for technological purposes, we can consider here among other things coal gasification and possibly thermal water fission as areas of utilization. In this kind of integrated energy system, the fast breeder reactor assumes the function of electric energy production in the basic load sector, in addition to a series of thermal reactors, and fission material production for the entire nuclear energy sector in terms of expanded reproduction, whereby the system now only is supplied with natural uranium or thorium from the outside.

It follows from this requirement that the speed of plutonium accumulation must generally be greater than the speed required for securing the fuel supply for the next generation of fast reactors because the supply of the nonbreeding part of reactors in use must also be taken care of. If nuclear energy should reveal a doubling time of 10 years, then the plutonium doubling time must not be more than 8 years.

	(in 10^9 t SKE) Project	Worth mining (possibly X2)
Coal	11,200	3,800
Petroleum	740	370
Natural Gas	630	500

The currently most promising variant of fast breeder reactors is the sodium-cooled one. That applies both to the technical and the economic degree of maturity. At this time, three prototype breeder power plants are in operation: BN-350 in the USSR, Phenix in France, and the PFR in England (output between 250 and 350 MWe). The Soviet BN-600 is under construction; nuclear power plants with reactors in this performance category are to go into operation in various countries shortly. Plants on an order of magnitude of up to 1,200 MWe are presently in the preparatory phase.

We can generally say the following from the viewpoint of past operational experience.

Industrially usable sodium breeder reactors are technically quite feasible although the investment expenditure will be somewhat greater than that of the light-water reactors.

Experience has been good with the oxidic fuels; the burn-up limit is obviously near 10 percent; fuel element defects are about 3 permill. Operational performance is considered very positive; the planned parameters were attained throughout in sustained operations. Major difficulties came up only in the steam generators which, in all three prototype power plants, revealed differing degrees of damage. The technical implementation of large sodium-water-heat exchange surfaces at this time is undoubtedly the main problem in further development. Here the emphasis is primarily on quality problems in production although various concepts of steam generators are still competing with each other.

The doubling times of prototypes in operation presently are about 15-20 years. That is the main problem in further development which we must solve in addition to the steam generator problem. Roughly speaking, the doubling time T depends on the following magnitudes: it is proportional to the fuel density in the reactor core; it is inversely proportional to the breeding factor reduced by 1 and to the output density and it becomes smaller as the external fuel cycle time is reduced. It can be reduced by increasing the output density, reducing the moderating properties of the core materials and other measures in core design. For the BN-600 we expect a doubling time of about 12 years; for the BN-1600, now being planned, we expect about 8 years. To shorten this time to 5-6 years (which would offer adequate security at identical energy growth rates over longer periods of time) we however need to switch to new fuel compounds, such as the carbides.

Reducing the external fuel cycle time is particularly problematical because the presently available methods of reprocessing and fuel element production are still entirely too time consuming. In addition to the variant of the sodium-cooled fast breeder reactors, other variants were developed with He and N_2O_4 cooling; but they are still far away from technical maturity. Nevertheless, we must absolutely follow them up as reserve variants for reducing the doubling time from the relatively secure 8 years for the large sodium breeder to 5-6 years. From the fuel supply viewpoint and considering the technical realities, we therefore get two employment phases for fast breeder reactors:

During the first phase, reactors with relatively long doubling times (about 8 years) must be operated with plutonium from thermal reactors, possibly by adding enriched uranium. Limiting factors for the scope of this program are practically only the plutonium quantities on which we can fall back.

In the second phase, it is necessary to use reactors with shorter doubling times (5-6 years) which work with the plutonium from the reactors of the first phase. Their plutonium accumulation must secure the expanded reproduction of the entire nuclear energy system.

As a comparison between the existing technical reality and the objectives reveals, research--including basic research--and technology still face a great chapter with significant content which, in spite of all optimism, requires considerable efforts if the problem is to be solved. In addition we have the fact that a shift in the time at which we employed the first generation of fast reactors will increase the scope of that generation because otherwise it will be impossible to attain the growth rate. That however implies larger starting quantities of plutonium or uranium.

Since it is hardly to be assumed that an industrially significant potential of fission power plants will be available over the next 40-50 years, one must with all emphasis pursue the solution of the problems connected with breeder development during the next 10-15 years.

5058
CSO:2302

INITIATIVES IN INTERNATIONAL SCIENTIFIC COOPERATION HIGHLIGHTED

Budapest MAGYAR TUDOMANY in Hungarian No 5, May 77 pp 352-356

/Article by Istvan Lang/

/Text/ The international scientific relations of the Hungarian Academy of Sciences grew significantly since 1966, when the science-policy guidelines were promulgated. New agreements of cooperation were concluded with the academies of sciences and international research centers of several capitalist countries. The personal relations of the scientists expanded also: many more Hungarian scientists participate in the leadership and work of international scientific organizations than before, and there are more opportunities for attending conferences,congresses, and other events than 7-8 years ago.

In this period, the cooperation of the scientific circles of the socialist countries was characterized by qualitative and quantitative growth. The bilateral relations among the academies of sciences became more systematic, better founded, and more purposeful. The work plans were established for five-year periods (1976-1980) in advance, and the subjects were specified and set by the institutions concerned. New forms of cooperation, such as joint journals, joint committees, and instrument exchange agreements, were also established. The multilateral scientific cooperation broadened significantly during this period; this is due primarily to the promulgation of the Comprehensive Program of the CEMA.

This cooperation unfolded in three directions:

- The Permanent Committees of the CEMA and the CEMA Scientific-Technical Cooperation Committee established programs in their work plans,

- Major scientific and technical enterprises (such as the Joint Atomic Research Establishment in Dubna, the Unified Computer-Technology System, the Interkosmos program, and so forth) were established by intergovernmental agreements,

- The academies of sciences concluded multilateral cooperation agreements for the joint handling of natural-science and social-science problems, for the establishment of four cadre-training centers, and for the setting up of the international social-sciences information center (MISZON).

Many academicians, scientists of research institutions and supported university departments and museums, and facilities and service organs of the MTA /Hungarian Academy of Sciences/ now participate with the socialist joint work. The results of this cooperation are evident not only from jointly published papers, books, patents, and technical innovations but also from improved personal relations, new intellectual achievements, and better language capabilities.

Specific Cooperation Plans

A. P. Aleksandrov, chairman of the Academy of Sciences of the Soviet Union, recommended in the summer of 1976 that the leaders of the academies of sciences of the socialist countries discuss the possibilities of rapid increase of the intensiveness of cooperation. This initiative was welcomed. A start was soon made in the collection, selection, and prioritization of those proposals which concerned the problems and methods of cooperation. For the joint discussion of the concepts and for the preparation of a meeting of the chairmen of the academies of sciences in Moscow in November 1976, a conference of the general secretaries was held. This conference developed the agenda and determined the further phases of preparation.

At this preparatory conference, there was agreement about the fact that cooperation is necessary and realistic in two areas, where quick and effective cooperation is desirable:

- Computerized automation of scientific research projects,
- Development and manufacture of instruments needed in scientific research.

Experts had to meet in order to prepare the specific recommendations in these two matters. The presidium of the Hungarian Academy of Sciences undertook the preparation and operation of the meeting dealing with computerized automation of research.

This offer was logical since the Central Research Institute for Physics of the Hungarian Academy of Sciences has cooperated successfully for years with Soviet research institutions in the area of computerized processing of measurement results, the computerized evaluation of the data, and the systems suitable for the control of the processes examined. Specifically, there was cooperation in the adaptation and further development of the so-called CAMAC system. This also meant the manufacture of the modules required for this system. East-German, Polish, and Czechoslovak partners also cooperated here.

The discussion of the experts was held between 17 and 20 January 1977 in Budapest; leaders and staff members of the KFKI gave wide assistance in the discussion. The team of experts from the MTA was headed by Mihaly Sandory, director of the Institute of Metrology and Computer Technology of the KFKI.

The discussion about the development of instruments for research and about specialization was held early February 1977 in Moscow. The Hungarian delegation taking part in the discussion was headed by Academician Erno Pungor, director of the Instrument Committee of the MTA.

The conference of general secretaries held in Moscow also recommended that each academy report about the manner in which they implement the congress resolutions adopted by the individual communist and worker parties. There was also a proposal that the chairmen's conference place on its agenda the conclusions of the social-sciences subchairmen's conference which was held in Warsaw in 1976.

These were the background events that preceded the conference of the chairmen of the academies of sciences of the socialist countries, held 15 February 1977 in Moscow, at the CEMA Secretariat building. The delegation from the MTA was headed by Janos Szentagothai. The members of the delegation were Ferenc Marta, general secretary, Istvan Lang, deputy general secretary, Mrs Sandor Keleti, head of the Foreign Affairs Secretariat of the presidium, Janos Somlo, main department head of the Research Institute for Computer Technology and Automation, Ferenc Toro, deputy director of the Research Institute for Computer Technology of the KFKI, and Jozsef Bocskai, scientific attache of the embassy.

In addition to the hosts, the conference was also attended by the presidents, general secretaries, and leading staff members of the academies of sciences of Bulgaria, the German Democratic Republic, Cuba, Mongolia, Poland, Romania, and Czechoslovakia.

The head of the Social Sciences Committee of the Socialist Republic of Vietnam and many senior scientists from Vietnam also attended.

The heads of the delegations reported in detail about the manner in which the academies of sciences of the individual countries contributed toward the implementation of the resolutions of the party congresses held in recent years. This item on the agenda informed all present about the major socio-political tasks, goals, and methods.

The social-sciences chairmen met in Warsaw in 1976; the results of this meeting were also discussed. The report and assessment about the results indicated that there is an increasing cooperation among the academies of sciences in the field of social sciences. The long-range cooperation program in the field of social sciences adopted in Warsaw was reconfirmed. The head of the MTA delegation reiterated his earlier invitation for the next session of the social-sciences subchairmen to be held in Budapest, during the spring of 1978.

Automation of Measurements

Before the debate of the agenda, the delegates were taken to the permanent exhibition showing the achievements of the national economy. In one of the exhibition halls, various experimental devices were shown: they were connected to computerized automation systems with the aid of CAMAC units. The computers used were those in the minicomputer system developed jointly by the socialist countries. Among the peripheral units shown, several originated from VIDEOTON and MOM /Hungarian Optical Works/ At this exhibition, the KFKI demonstrated the TPA 11/40 minicomputer in operation together with the CAMAC system connected to it. This computer, a VIDEOTON product, found great interest and appreciation among the visitors.

One of the primary goals of the cooperative effort of the academies of sciences of the socialist countries is to replace the partial automation of research activities by a fully automated system, using the small computers contained in the Unified Computer Technology System of the Socialist Countries for the primary processing of the data and for the control of the processes involved. There was an agreement specifying that the measuring and control functions of the processes examined be performed by CAMAC modules.

The work program adopted set the deadline of 1980 for the accomplishment of ten major tasks: establishment of computer

networks, automated processing of oceanographic data, processing the spectroscopic examination data of biological objects with the aid of minicomputers and CAMAC units, processing of photographs taken by spaceships and satellites, automation of plasma-physical, laser, and nuclear fusion process studies, automation of hydrodynamic studies, establishment of automated methods for neurobiological and neurophysical studies, automation of methods for examining the genetics and biophysics of cells, standardization of the exchange of measurement information, and methods for the primary processing of experimental data.

The MTA expressed an interest in seven of these ten main areas.

In addition, a special list was prepared about the number of CAMAC system unit to be completed by each country by the end of 1980. In this list, only four countries are listed (Soviet Union, Hungary, Poland, Czechoslovakia). These countries already have a background in the production of components and modules of this kind.

Instrument Manufacture

Within the framework of CEMA cooperation, much has already been accomplished in the field of manufacturing instruments required for scientific research and in the field of designing major and more complex specific instruments. The meeting of the leaders of the academies of sciences intended to spur further the cooperation among the socialist countries and to promote the specialized production of various individual and small-series instruments in academic research establishments and instrument-making sections.

The cooperation program which has been adopted is quite specific. Those instruments were included in the plans for which the various academic institutions and industrial enterprises already have the required intellectual and equipment background. This means that the obligations undertaken are based on reality. The specialized production of a total of 167 instruments was contemplated; Hungary is interested in 20 of these, either as the coordinator in charge (16 instruments) or as a cooperating partner (four instruments). The quantity and the level of the Hungarian obligation is about the same as those of Poland and East Germany. Only the Czechoslovaks undertook more -- not counting the Soviet Union. Here are some examples of the instruments which Hungary will produce: Mossbauer analytical laboratory, automatic amino-acid analyzer, fermentator for the laboratory growing of microorganisms, ultracentrifuge for analytical and preparative purposes, CAMAC system modules, and so forth. In addition to

the institutes of the MTA, several domestic industrial enterprises and cooperatives (MOM, Chinoin, United Incandescent Lamp Factory, Labor NIM /Ministry of Heavy Industry/ RADELKIS) as well as Budapest Technical University expressed an interest in this undertaking.

A decision was reached for the administration of the further work; according to this decision, both subject areas -- automation and instrument manufacture -- will be headed and run by a coordinating committee soon to be established under the leadership of the heads of the academic bodies concerned. The job of this committee will be to finalize the working programs, to perform the required administrative functions, to coordinate the applications between the academic research establishments and the authorities, as well as between these establishments and industries, both domestically and internationally.

The Importance of Cooperation

L. I. Brezhnev, general secretary of the Central Committee of the Communist Party of the Soviet Union, received the presidents of the academies of sciences of the socialist countries on 17 February 1977. At this meeting, Comrade Brezhnev delivered a speech in which he stressed that "when socialist countries cooperate, the forces are not just added but multiplied. This applies fully to scientific relations also." (The full text of the address was published in the 18 February 1977 issue of PRAVDA.)

The general secretary of the Communist Party of the Soviet Union explained that there is wide support for basic research but that it is important to ensure that such research is closely related to applied studies so that they accelerate the introduction of the achievements of scientific research into the national economy. Large sums are spent in the Soviet Union for research; however, they are well spent. He also mentioned that a study has recently been made of the achievements of the scientific community of the Ukrainian Soviet Socialist Republic, which showed that every ruble expended by the Ukrainian Academy of Sciences gave a five-ruble profit to the national economy.

But the achievements of scientific research cannot be measured in terms of money alone. He stated with satisfaction that cooperation in the field of social sciences was also an important item on the agenda of the chairmen of the academies of sciences. The results of studies in the social sciences may be utilized in developing social consciousness. He praised the fact that

an important matter for science in general and for the national economy in particular -- namely automated scientific research and instrument manufacture -- has been well taken care of.

At the end of his address, he drew attention to the fact that the scientists of the socialist countries play an active role in the solution of such global problems facing mankind as the protection of the environment, energy, fight against major diseases, and more. The scientists of the socialist countries should take part in the fight for peace and should work toward the prevention of thermonuclear war. The Great October Socialist Revolution 60 years ago raised the banner of peace and free labor. Now, the peoples of the socialist countries rally around this banner. The cooperation among these peoples is becoming more and more intensive in all fields, including the field of science.

Major decisions were reached at the latest meeting of the heads of the academies of sciences of the socialist countries. Realization of these decisions will doubtlessly spur the intensification of research and will provide major achievements for the benefit of the national economy through discoveries and their introduction in everyday life.

2542
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CONFERENCE ON ANALYTICAL METHODS OF INVESTIGATING SOLIDS HELD

Budapest MAGYAR TUDOMANY in Hungarian No 5, May 77 pp 388-389

/Article by Laszlo Polos/

/Text/ The Solid-State Physics Complex Committee of the Hungarian Academy of Sciences and the Coordinating Council of Solid-State Studies held a two-day conference on the "Analytical Methods of Investigating Solid Surfaces" in Dobogoko on 2-3 November 1976.

The conference was opened by Academician Lenard Pal, chairman of the Complex Committee and the Coordinating Council. In his introductory remarks he stressed the importance of surface studies in semiconductor research, investigation of heterogeneous catalytical processes, and adsorption phenomena. One of the goals of the conference is to review the techniques available in Hungary and the achievements of domestic research to date; these must be compared to techniques and achievements elsewhere in the world.

Six papers were presented at the scientific conference; a brief summary of them follows:

Academician Denes Berenyi (ATOMKI /Nuclear Research Institute/ in Debrecen) presented a paper entitled "Use of Electron-Spectroscopic (ESCA) Methods in the Analysis of Surfaces." The principle of the method is to generate electrons from the samples with the aid of X-ray or ultraviolet radiation, and to analyze these photoelectrons so as to obtain information about the elemental analytical and chemical structure. In surface studies, we obtain depth information from an approximately 10Å layer; however, an impurity of less than 1 percent may be detected in a monolayer.

The lecturer compared the method with other effective methods for surface analysis and concluded that it has the advantage over them of providing not only elemental-composition but also structural information, while at the same time it does not destroy the surface as other methods do.

Candidate Terez Kormany (TKI [Telecommunications Research Institute] in Budapest) presented a paper entitled "Analyses of Surface Layers With the Aid of Electron Probe." Electron-probe microanalysis is an analytical method which permits chemical analyses to be carried out from a volume of one micrometer cubic volume, weighing 10^{-11} grams. In the course of the analysis, the specimen is bombarded with an electron beam of appropriate energy, which is focused. As a result of this bombardment, X-rays are emitted from the specimen. This radiation is analyzed to obtain qualitative and quantitative composition information about the material.

Assessment of the surface of the solid material may be made by means of the electron probe; the phase composition may be determined, the element distribution on the surface may be established, and surface contaminations and segregations may be identified. This method permits the examination of the layer thickness and composition of the so-called thin layers also.

Candidate Peter Barna (MTA MFKI [Research Institute of Technical Physics, Hungarian Academy of Sciences] in Budapest) presented a paper entitled "Electron-Beam Methods of Surface Analysis."With the aid of electron beams, we may analyze the surface of the specimen simultaneously in several layers and for several properties. The electron-beam methods are suitable for the analysis of microranges (ranges encompassing a few tenths or hundredths of an Angstrom), and they may provide information about the localization of the microranges in the base matrix, meaning the bulk material, also. With the aid of these methods we may determine the distribution and structure of the elements and any segregations. On the basis of this information we may characterize, interpret, and influence the mechanisms of individual technical processes.

Janos Giber, doctor of chemical sciences (BME [Budapest Technical Unibersity]) presented a paper entitled "Use of Ion-spectroscopic methods for the Study of Surfaces and Surface Layers." The paper reported about the status of methods collectively called SIMS (Secondary Ion Mass Spectrometry) and outlined their prospects on the basis of achievements so far. The principle of the methods is that if we bombard solid surfaces with high-energy (20 to 80 eV) ions in an ultravacuum,

we may atomize the surface layer by layer. A small portion of the atomized atomic particles represents positive or negative ions. These ions may be determined qualitatively and quantitatively in the quadrupole mass spectrometer. In this manner it becomes possible to evaluate the surface layer by layer and to measure depth profiles. The apparatus was supplemented at the Physics Institute of BME with a scanning ion gun, and as a result the lateral resolution increased to 20-40 micrometers, and the depth resolution to 1-3 monolayers. The research team studied the effect of the use of a small oxygen background pressure (10^{-6} torr) during bombardment to ensure the oxidation of the layer. This reactive atomization was found to be suitable for the determination of the thickness of surface layers.

Tibor Kantor, staff scientist, (BME) presented a paper entitled "Atomic Spectroscopy Methods for the Analysis of Solid Surfaces." By measuring the emission, absorption or fluorescence of free atoms obtained from solid surfaces thermally or by means of ion-atomization, direct information may be obtained about the elemental composition of the surface. By using a suitably chosen light source or atom source, structural differences in the specimens may be observed. However, the main area of atomic spectroscopy is the determination of the concentration.

Microspark and line spark excitation is often used for the examination of surface metal-alloy concentration distribution. In this way we may analyze surface portions with an area of 0.2 to 0.5 mm diameter. For the examination of the depth distribution of the components, the use of Grimm-type vacuum discharge has been recently introduced; in this way, a uniform material removal (cathodic atomization) takes place at the rate of 0.05-0.1 micrometers per minute over a 8-10 mm diameter surface sector.

The use of solid-state lasers in conjunction with a microscope permits the direct analysis of electrically non-conductive materials by means of atomic spectroscopy. By using Nd-glass and ruby lasers of relatively low energy, layers of at least 5-30 micrometer diameter and 0.1-1 micrometer thickness may be analyzed. There are emission and atomic absorption versions of laser microprobe analysis. One goal of the study of depth distribution may be the determination of the thickness of surface metal layers. For this purpose a solution was recently developed in which the vapors generated with the laser beam or the aerosols generated with the laser beam are examined by means of atomic absorption. The paper discussed in some detail

the determination of the thickness of galvanic coatings of silver, gold, and nickel by this method.

Candidate Jozsef Gyulai (KFKI /Central Research Institute for Physics/ in Budapest) presented a paper entitled "Use of Particle (alpha, beta ray) Backscattering for the Analytical Examination of Surfaces." The principle of the method is to bombard the surface with ions that had been accelerated in a vacuum, and to analyze the energy spectrum of the backscattered ions with the aid of a multichannel analyzer. Information about chemical structure is obtained for a depth of 1-5 micrometers of the surface layer. This high-speed and non-destructive method permits the examination of concentration distribution in depth for elements ranging between lithium (having a low atomic number) and uranium. The sensitivity increases with increasing atomic number of the element.

The method also provides information about lattice defects occurring in large numbers in crystalline bodies, about their distribution and location within the lattice.

Utilizing the resonances of the Rutherford scatter, researchers of the KFKI increased the sensitivity of oxygen determination so that they can now detect 5 to 100 monolayers. Current studies are in the area of increasing the depth and spatial resolution of the method.

Five reports followed the papers. In these reports, the speakers described surface-analysis methods not discussed in the papers. The reports were followed by a debate.

The scientific conference provided an opportunity to phycists, chemists, technologists, and users to exchange their ideas and to discuss their problems. In this manner the conference contributed to better mutual understanding among those in various disciplines working in this field. A "common language of dialog" was also established. The lack of such a language has for some time created many problems in interdisciplinary studies. There was also an opportunity to compare the various methods of surface analysis and to analyze the situation at home and abroad.

It should be noted, however, that many subjects concerning the analysis of surfaces were not touched upon at this conference, for example sampling, sample preparation, standardization in all its ramifications, and measurement of other properties than those determinable analytically. The debate pointed out the fact that more attention must be given to surface effects as collective phenomena and to the interactions involved.

It also became evident in the course of the debate that material science did not become a science in its own rights -- as it did in other countries -- in Hungary, The authorities in charge must make great efforts toward ensuring that material science is given its own place under the sun in Hungary.

Most of the methods of surface analysis are available in Hungary, basically. But in addition to keep up to date in a dynamic manner, the laboratories studying surface properties by analytical means must be significantly upgraded.

It is necessary to hold in the future some narrow discussions and symposia dealing with some specific material types (such as Si, pure Al, pure Cu) in terms of their surface analysis. The situation is ripe for the debate of complex problems -- transcending methodological aspects -- such as heterogeneous catalysis, physico-chemical properties of surfaces, and surface reactions.

2542
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ROSTER OF DOCTORS OF SCIENCES PUBLISHED

Budapest MAGYAR TUDOMANY in Hungarian No 4, Apr 77 pp 311-312

/News From the Committee of Scientific Qualification: New Doctors of Sciences, January 1977/

/Text/ The Committee of Scientific Qualification declared

Bela Alberth, doctor of medical sciences, on the basis of his dissertation entitled "Surgical Therapy of Total Leucoma"; the opponents were: Janos Gergely and Agost Kahan, doctors of medical sciences, and Margit Varga, candidate of medical sciences;

Attila Biro, doctor of technical sciences, on the basis of his dissertation entitled "Investigation of Heat-Transmission Conditions in Metallurgical Heat-Treatment Furnaces Fired With Natural Gas"; the opponents were: Sandor Simon, academician, Ferenc Sulcz, candidate of technical sciences, and Gabor Bassa, doctor of technical sciences;

Karoly Boroczky, doctor of mathematical sciences, on the basis of his dissertation entitled "Sphere Placements on Spaces With Constant Curvature and With n Dimensions"; the opponents were: Laszlo Fejes Toth, academician, Gyula Strommer, doctor of mathematical sciences, and Aladar Heppes, candidate of mathematical sciences;

Istvan Erdelyi, doctor of historical (archeological) sciences, on the basis of his dissertation entitled "The Avar Era and the Orient as Reflected by Archeological Sources"; the opponents were : Janos Harmatta, academician, Samu Szadeczky-Kardoss, doctor of literary sciences, and Gyula Laszlo, doctor of historical sciences;

Istvan Hargittai, doctor of chemical sciences, on the basis of his dissertation entitled "Determination of Molecular Structure With the Aid of Electron Diffraction"; the opponents were: Ferenc Torok and Gyorgy Varsanyi, doctors of chemical sciences, and Lehel Zsoldos, candidate of physical sciences;

Marton Horvath, doctor of educational sciences, on the basis of his dissertation entitled "The General School in Our Public Education System"; the opponents were: Gyorgy Agoston, Jozsef Szarka, and Sandor Kote, doctors of educational sciences;

Mihaly Ihasz, doctor of medical sciences, on the basis of his dissertation entitled "Surgical Treatment of Peptic Ulcers by Means of Vagotomy and the Pathophysiological Effects of This Treatment on the Functioning of the Digestive Organs"; the opponents were: Gyorgy Bornemisza, Tibor Javor, and Laszlo Poka, doctors of medical sciences;

Antal Kaldor, doctor of medical sciences, on the basis of his dissertation entitled "Investigation of Drug Effects, Side Effects, and Interactions in Humans"; the opponents were: Gyorgy Gabor, Tibor Javor, and Karoly Kelemen, doctors of medical sciences;

Barna Kelentey, doctor of medical sciences, on the basis of his dissertation entitled "Transport Through Biological Membranes"; the opponents were: Tibor Javor, Janos Somogyi, and Ferenc Varga, doctors of medical sciences;

Ferenc Kovacs, doctor of technical sciences, on the basis of his dissertation entitled "Determination of the Expected Magnitude of Gas Eruption Hazards and the Evaluation of Their Economic Ramifications"; the opponents were: Ferenc Martos, academician, Andras Prekopa, doctor of mathematical sciences, and Istvan Tamasy, candidate of technical sciences;

Janos Kovacs, doctor of economic sciences, on the basis of his dissertation entitled "Three Spheres of the Reproduction of Labor in Society"; the opponents were: Katalin Szikra (Mrs Falus), academician, Geza Kovacs, doctor of economic sciences, and Jozsef Rozsa, candidate of economic sciences;

Antal Madl, doctor of literary sciences, on the basis of his dissertation entitled "The Humanism and Man-Image of Thomas Mann"; the dissertation was defended in the German Democratic Republic;

Andras Nagy, doctor of economic sciences, on the basis of his dissertation entitled "Structural Analysis and Forecasting of International Trade"; the opponents were: Laszlo Drechsler and Ferenc Kozma, doctors of economic sciences, and Maria Augusztinovics, candidate of economic sciences;

Adam Schmidt, doctor of economic sciences, on the basis of his dissertation entitled "Relationships Among Upper-Level Plans"; the opponents were: Geza Kovacs and Miklos Riesz, doctors of economic sciences, and Tamas Bacskai, candidate of economic sciences;

Miklos Simonyi, doctor of chemical sciences, on the basis of his dissertation entitled "Investigation of the Radical Reactivity of Phenols in the Liquid Phase"; the opponents were: Endre Koros and Robert Schiller, doctors of chemical sciences, and Tibor Berces, candidate of chemical sciences, and

Emil Varga, doctor of medical sciences, on the basis of his dissertation entitled "Investigation of the Changes in the Membrane Potential of the Skeletal Muscles With the Aid of Various Depolarizing Alkaloids"; the opponents were: Jozsef Tigyi, academician, and Sandor Kelemen and Janos Somogyi, doctors of medical sciences.

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ROSTER OF NEW DOCTORS AND CANDIDATES OF SCIENCES PUBLISHED

Budapest MAGYAR TUDOMANY in Hungarian No 5, May 77 pp 392-393

/News from the Committee of Scientific Qualification: New Doctors and Candidates of Sciences, February 1977/

/Text/ The Committee of Scientific Qualification declared Mihaly Bartok, doctor of chemical sciences, on the basis of his dissertation entitled "Conversion of Dioles, Oxa-Cycloalkanes, and 1,3-Dioxa-Cycloalkanes on Metal Catalysts"; the opponents were: Laszlo Marko and Pal Tetenyi, academicians, and Jozsef Petro, candidate of chemical sciences;

Lajos Hajdu, doctor of political and legal sciences, on the basis of his dissertation entitled "Administrative Reforms of Joseph The Second in Hungary"; the opponents were: Andor Csizmadia, doctor of political and legal sciences, Jozsef Halasz, candidate of political and legal sciences, and Janos Varga, doctor of historical sciences;

Gyorgy Lajtha, candidate of technical sciences, on the basis of his dissertation entitled "Methods for Designing Telecommunication Networks"; the opponents were: Laszlo Kozma, academician, Sandor Csibi, doctor of mathematical sciences, and Pal Molnar, candidate of technical sciences;

Katalin J. Soltesz, doctor of linguistic sciences, on the basis of her dissertation entitled "The Function and Meaning of the Proper Noun"; the opponents were: Bela Kalman, academician, Janos Balazs, doctor of linguistic sciences, and Tamas Foldesi, doctor of philosophical sciences;

Jozsef Szabolcs, doctor of chemical sciences, on the basis of his dissertation entitled "Investigations in the Field of Carotenoids"; the opponents were: Rezso Bognar, academician, Mihaly Nogradi and Pal Sohar, doctors of chemical sciences;

Lajos Takacs, candidate of historical sciences, on the basis of his dissertation entitled "Remnants of our Extermination Management. Extermination Fields, Methods of Extermination"; the opponents were: Ivan Balassa, Bela Gunda, and Janos Varga, doctors of historical sciences; and

Edit Vertes, doctor of linguistic sciences, on the basis of her dissertation entitled "Interactions of the Ostyak Phonems"; the opponents were: Bela Kalman, academician, Gyorgy Szepe, candidate of linguistic sciences, and Janos Balazs, doctor of linguistic sciences.

The Committee of Scientific Qualification declared
Csilla Banyasz, candidate of technical sciences, on the basis of her dissertation entitled "Identification of Linear Dynamic Processes on the Basis of Sampled Data";

Pal Barczy, candidate of technical sciences, on the basis of his dissertation entitled "Metallographic Examination of the AlMgSil Refinable Alloy";

Gyula Danko, candidate of veterinary medical sciences, on the basis of his dissertation entitled "Pathology of Stachybotryotoxicosis";

Lorand Debreczeni, candidate of medical sciences, on the basis of his dissertation entitled "New Arterial Fields and the Large-Arterial Circulation in Rats";

Gyorgy Devai, candidate of biological sciences, on the basis of his dissertation entitled "Possibilities of Biological Water Quality Assessment in View of the Chorological-Ecological Processing of Odonata";

Vendel Duduk, candidate of veterinary medical sciences, on the basis of his dissertation entitled "Data on the Feeding and Physiological Importance of Genisteine in the Feeding of Poultry-Hybrid chicken and Egg-Laying Chicken";

Laszlo Fenichel, candidate of chemical sciences, on the basis of his dissertation entitled "Role of Lewis-Acid Complexes in Some Reactions Catalyzed With Boron Trifluoride, Titanium Tetrachloride, and Titanium Tetrabromide";

Antal Ferencz, candidate of medical sciences, on the basis of his dissertation entitled "Effect of Irradiation on the Biosynthesis and Decomposition of Ribonucleic Acid in Liver Tissue";

Istvan Fodor, candidate of literary sciences, on the basis of his dissertation entitled "Some Aspects of the Development of the Socialist Literature Approach in France";

Mrs Miklos Gabor, candidate of chemical sciences, on the basis of her dissertation entitled "Antioxidant Effect of Some Anthocyanines";

Gusztav Gotz, candidate of earth (meteorological) sciences, on the basis of his dissertation entitled "The Role of Latent Heat Generation in the Development of Movement Systems With Synoptic Scale";

Ferenc Gyaraki, candidate of educational sciences, on the basis of his dissertation entitled "Possibilities of the Use and Optimization of Algorithms and Algorithmic Instructions";

Istvan Havas, candidate of technical sciences, on the basis of his dissertation entitled "Investigation of Fracture Features in Structural Steels Having a Strength of 52 kp/sq mm";

Hilmi Abdel-Rahman Abdel-Haid, candidate of agricultural sciences, on the basis of his dissertation entitled "Effect of the Protein Deficiency, Incorrect Calcium:Phosphorus Ratio, and Gonadotropic Hormone on the Sexual Maturation of Sheep";

Laszlo Institoris, candidate of chemical sciences, on the basis of his work on anti-tumor drugs, combined in theses;

Ferenc Irk, candidate of political and legal sciences, on the basis of his dissertation entitled "Criminological Ramifications of Traffic Accidents";

Gyorgy Kalmar, candidate of economic sciences, on the basis of his dissertation entitled "Changes in the Economic and Social Structure in Tropical Africa, as Examplified by Ghana";

Matyas Koltai, candidate of medical sciences, on the basis of his dissertation entitled "Analysis of the Infection-Causing Effect of the Anaphylactoid Type of Insulin";

Janos Koncz, candidate of educational sciences, on the basis of his dissertation entitled "Investigation of the Teaching Profession From the Point of View of the Needs of Building a Developed Socialist Society";

Gabor Kovacs, candidate of chemical sciences, on the basis of his dissertation entitled "Preparation and Examination of Prostaglandins";

Andras Kozma, candidate of agricultural sciences, on the basis of his dissertation entitled "Some Economic Problems of the Forecasting of Complex Machinery Systems of Crop Growing";

Imre Lengyel, candidate of biological sciences, on the basis of his dissertation entitled "Paleoserologic Studies";

Barnabas Mandi, candidate of medical sciences, on the basis of his dissertation entitled "Supportive-Tissue Changes in Immunodeficient Animals. Possibilities of Correction With Biologically Active Thymosine";

Ferenc Mezei, candidate of physical sciences, on the basis of his dissertation entitled "Investigation of Impure Metal - Insulator - Metal Tunnels";

Tivadar Miholics, candidate of political and legal sciences, on the basis of his dissertation entitled "Obligation to Work in Labor Jurisprudence";

Janos Nagy, candidate of economic sciences, on the basis of his dissertation entitled "Integration Processes and Trends in the Agriculture of the CEMA Countries";

Pal Pacher, candidate of physical sciences, on the basis of his dissertation entitled "Multiplet Structure of the Electron Spectra of Biatomic Molecumes";

Ferenc Palhegyi, candidate of psychological sciences, on the basis of his dissertation entitled "Employment of Persons With Deficient Vision in Frustrational Situations";

Botond Penke, candidate of chemical sciences, on the basis of his dissertation entitled "Synthesis of Biologically Active Peptide Fragments by Means of Fast Methods";

Tibor Polgar, candidate of technical sciences, on the basis of his dissertation entitled "Theory and Practical Aspects of the Optmum Designing of Arc-Killing Structures With Deion Panels";

Mrs Miklos Rakosi, candidate of chemical sciences, on the basis of her dissertation entitled "Use of Ultraviolet Spectrophotometry in Flavonoid Research";

Sandor Sipka, candidate of educational sciences, on the basis of his dissertation entitled "Hundred Years (1850-1950) of Hungarian Literature-History Textbooks";

Sandor Suranyi, candidate of economic sciences, on the basis of his dissertation entitled "The Matter of Indian Agriculture";

Janos Szabo, candidate of agricultural sciences, on the basis of his dissertation entitled "Economic Aspects of the Development of the Cattle Branch";

Katalin Szalay, candidate of medical sciences, on the basis of her dissertation entitled "Possible Role of the Concentration Ratio of Extracellular and Intracellular Potassium in the Glomerulosa Zone in the Regulation of the Secretion of Aldosterone";

Laszlo Szilagyi, candidate of technical sciences, on the basis of his dissertation entitled "Model of the Steady-State Operation of Electric Energy Systems";

Janos Szita, candidate of political and legal sciences, on the basis of his dissertation entitled "Beginning of Bourgeois Financial Law and Administration in Hungary During 1848-1867";

Arpad Toth, candidate of political and legal sciences, on the basis of his dissertation entitled "Major Problems of Exceptional Might During the Era of Dualism";

Laszlo Toth, candidate of economic sciences, on the basis of his dissertation entitled "Use of the Methods of Futurology in Studying Food Production"; and

Csaba Varga, candidate of political and legal sciences, on the basis of his dissertation entitled "Basic Theoretical Problems of Codification (Codification as a Socio-Historical Phenomenon)."

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